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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,194	06/23/2003	Yoshi Ono	SLA 0669	9996

7590 08/16/2004  
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EXAMINER
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NGUYEN, KHIEM D

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/602,194

Applicant(s)

YOSHI ONO

Examiner

Khiem D Nguyen

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 June 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-2 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al. (U.S. Patent 5,585,148).

In re claim 1, Suzuki discloses a method of low-temperature nitridation of a silicon substrate comprising (col. 9, line 32 to col. 10, line 51 and **FIGS. 1-8**): placing a silicon wafer (**FIG. 6: 2**) in a vacuum chamber (**FIG. 6: 1**) on a heated chuck (**FIG. 6: 20**); maintaining the silicon wafer at a temperature of between about room temperature and several hundred °C (col. 9, lines 37-39); introducing a nitrogen-containing gas into the vacuum chamber (col. 9, lines 39-43); dissociating the nitrogen-containing gas into nitrogen with a excimer lamp (col. 9, lines 47-50 and col. 12, lines 20-24) and flowing the nitrogen over the silicon wafer; and forming an silicon nitride layer on at least a portion of the silicon wafer (col. 9, lines 52-57).

In re claim 2, Suzuki discloses wherein the method of claim 1 which further includes maintaining the vacuum chamber at a pressure of between about 1 to 20 Torr (col. 9, lines 43-47).

In re claim 6, Suzuki discloses wherein the nitrogen-containing gas is taken from the group of gases consisting of NH<sub>3</sub> (col. 9, lines 39-43).

In re claim 7, Suzuki discloses wherein the forming includes providing a positively charged interface across the nitride layer (col. 9, lines 52-57).

In re claim 8, Suzuki discloses wherein placing includes placing a silicon wafer having a layer of silicon oxide on the upper surface thereof in a vacuum chamber (col. 9, lines 58-63).

2. Claims 16-18 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki et al. (U.S. Patent 5,585,148).

In re claim 16, Suzuki discloses a method of low-temperature nitridation of a silicon substrate comprising (col. 9, line 32 to col. 10, line 51 and **FIGS. 1-8**): placing a silicon wafer (**FIG. 6: 2**) in a vacuum chamber (**FIG. 6: 1**) on a heated chuck (**FIG. 6: 20**); maintaining the silicon wafer at a temperature of between about room temperature and several hundred °C (col. 9, lines 37-39); providing a positively charged interface across the nitride layer (col. 9, lines 52-57); introducing a nitrogen-containing gas into the vacuum chamber (col. 9, lines 39-43); dissociating the nitrogen-containing gas into nitrogen with a excimer lamp (col. 9, lines 47-50 and col. 12, lines 20-24) and flowing the nitrogen over the silicon wafer; and forming an silicon nitride layer on at least a portion of the silicon wafer (col. 9, lines 52-57).

In re claim 17, Suzuki discloses wherein the nitrogen-containing gas is taken from the group of gases consisting of  $\text{NH}_3$  (col. 9, lines 39-43).

In re claim 18, Suzuki discloses wherein the method of claim 1 which further includes maintaining the vacuum chamber at a pressure of between about 1 to 20 Torr (col. 9, lines 43-47).

In re claim 22, Suzuki discloses wherein placing includes placing a silicon wafer having a layer of silicon oxide on the upper surface thereof in a vacuum chamber (col. 9, lines 58-63).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent 5,585,148) as applied to claims 1-2 and 6-8 above.

In re claims 3, 4, and 5, there is no evidence indicating the ranges of the gas flow rate, the time duration, and the thickness of the silicon nitride layer are critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

4. Claims 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent 5,585,148).

In re claim 9, Suzuki discloses a method of low-temperature nitridation of a silicon substrate comprising (col. 9, line 32 to col. 10, line 51 and **FIGS. 1-8**): placing a silicon wafer (**FIG. 6: 2**) in a vacuum chamber (**FIG. 6: 1**) on a heated chuck (**FIG. 6: 20**); maintaining the silicon wafer at a temperature of between about room temperature and several hundred °C (col. 9, lines 37-39); introducing a nitrogen-containing gas into the vacuum chamber wherein the nitrogen-containing gas is taken from the group of gases consisting of  $\text{NH}_3$  (col. 9, lines 39-43); dissociating the nitrogen-containing gas into nitrogen with a excimer lamp (col. 9, lines 47-50 col. 12, lines 20-24) and flowing the nitrogen over the silicon wafer; and forming an silicon nitride layer on at least a portion of the silicon wafer (col. 9, lines 52-57).

Suzuki does not explicitly disclose the wavelength range generated by the excimer lamp. However, there is no evidence indicating the wavelength range generated by the excimer lamp is critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation.

In re claims 10, 11, and 13, there is no evidence indicating the ranges of, the thickness of the silicon nitride layer, the time duration, and the gas flow rate are critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation.

See MPEP § 2144.05.

In re claim 12, Suzuki discloses wherein the method of claim 9 which further includes maintaining the vacuum chamber at a pressure of between about 1 to 20 Torr (col. 9, lines 43-47).

In re claim 14, Suzuki discloses wherein the forming includes providing a positively charged interface across the nitride layer (col. 9, lines 52-57).

In re claim 15, Suzuki discloses wherein placing includes placing a silicon wafer having a layer of silicon oxide on the upper surface thereof in a vacuum chamber (col. 9, lines 58-63).

5. Claims 19, 20, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (U.S. Patent 5,585,148) as applied to claims 16-18 and 22 above.

In re claims 19, 20, and 21, there is no evidence indicating the thickness of the silicon nitride layer, the time duration, and the gas flow rate are critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation. See MPEP § 2144.05.

#### ***Response to Amendment and Arguments***

Applicant's arguments filed June 4<sup>th</sup>, 2004 have been fully considered but they are not persuasive.

Applicant contends that the reference, Suzuki et al. (U.S. Patent 5,585,148), herein known as Suzuki does not teach nor suggest that a nitrogen-containing gas is dissociated by an excimer lamp.

In response to Applicant's contention that Suzuki does not teach nor suggest that a nitrogen-containing gas is dissociated by an excimer lamp, Examiner respectfully disagrees. Since the light from the illumination system 10 having a xenon lamp as the light source through the light introduction window 11 (col. 12, lines 19-23 and FIGS. 1-6), which is equivalent to an excimer lamp, this light source would provide sufficient energy to dissociate  $\text{NH}_3$  into N or  $\text{N}_2$ . Furthermore, as disclosed by Suzuki, the resulting layer is a SiN layer was formed uniformly with high quality on the substrate 2 (col. 9, lines 54-56). Hence, it is inherent that the nitrogen-containing gas  $\text{NH}_3$  (col. 9, lines 32-57) was dissociated by the light source from the illumination system to produce the SiN layer. For these reasons, Examiner holds the rejection proper.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.




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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.  
August 13, 2004



**W. DAVID COLEMAN**  
**PRIMARY EXAMINER**